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ON THE ORTHOPTERA OF NORTHERN ONTARIO.

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The few published records in Orthoptera from Northern Ontario are based on odd captures made by a number of collectors in various localities, no local lists having been published from any point north of Algonquin Park, where the writer collected in 1902 and 1903, and listed the species taken there in the 36th Ann. Rep. Ent. Soc. Ont. (1905). As Algonquin Park lies at the extreme southern limit of the Canadian Zone, its biota containing many Austral elements, we have still only a very fragmentary knowledge of the Orthopterous fauna of the strictly Boreal parts of the Province.

Since the Algonquin Park list appeared, the writer has collected Orthoptera in three localities in Northern Ontario, all situated well within the limits of the Canadian Zone. These are Fort William and Nipigon, Thunder Bay District, and the Temagami Forest Reserve, Nipissing District. Only a few days at the end of August, 1907, were spent at Fort William and Nipigon, and this brief time was occupied chiefly in collecting the species of the Odonate genus *Aeshna*; nevertheless, it is believed that nearly all the species of Orthoptera resident there were taken, though none in large series. In the Temagami District a fortnight's canoe-trip was made in the first half of September, 1908, and good opportunities for collecting were afforded.

To make the list as complete as possible the names have been added of a few other species previously known from Northern Ontario, which were not taken at the localities mentioned. A few others, not included in the list, have been taken at North Bay, Lake Nipissing, but probably do not range much further north, and are, perhaps, better excluded from the fauna of the Canadian Zone.

The combined result of these various records is, on the whole, what one would expect, judging from our knowledge of the Orthoptera of Northern Michigan as embodied in the following papers:

- 1898.—Blatchley, W. S. Two *Melanopli* from Les Cheneaux Islands, Michigan. *Psyche*, VIII, pp. 195-197.
- 1904.—Rehn, J. A. G. The Orthoptera of Keeweenaw Bay, Michigan. *Ent. News*, XV, pp. 229-237 and 263-269.
- 1906.—Morse, A. P. The Ecological Relations of the Orthoptera of the Porcupine Mountains, Mich. From "An Ecological Survey of Northern Michigan." C. C. Adams, in *Rep. Geol. Surv. Mich.*, 1905. (Includes also two species from Isle Royale, Mich.)
- 1909.—Hebard, Morgan. Additional Notes on the Orthoptera of the Keeweenaw Bay Region of Baraga Co., Mich. *Ent. News*, XX, pp. 155-158.

The Keeweenaw Bay list corresponds closely to that of the Thunder Bay District, Ont., the only species in the former not included in the latter being the introduced *Periplaneta Americana* and *Tetrix Luggeri*, whose claim to specific rank is questionable. Only four species from the Thunder Bay District are not reported from Keeweenaw Bay. The list from the Porcupine Mountains and Isle Royale is also of a similar character so far as it goes, but contains the additional species, *Melanoplus amplexens*, Scudd.; *Atlanticus pachymerus*, Burm., and *Ceuthophilus seclusus*, Scudd., all of which are Austral forms, whose occurrence in this northern locality is somewhat surprising.

In comparing the present list with that of Algonquin Park, we again find a considerable correspondence, but in the latter locality there are a number of Austral or Transitional forms, namely: *Tettigidea parvipennis*, Harr.; *Chortophaga viridifasciata*, De Geer; *Spharagemon Bolli*, Scudd.; *Scudderia furcata*, Brunn.; *Orchelimum vulgare*, Harr.; *Xiphidion brevipenne*, Scudd.; *Nemobius palustris*, Blatchley, and *Æcanthus fasciatus*, Fitch. Of the several western types in the other lists mentioned, only two were taken here, *Melanoplus Bruneri* and *Tetrix Brunneri*, both of which were quite local in occurrence. It may be mentioned, however, that another of the western forms, *Chlœaltis abdominalis*, has been recorded from the Severn River, about 40 miles south-west of Algonquin Park.

While the general characteristics of the Orthopterous fauna of Northern Ontario are thus quite in accord with what we should naturally expect, there are certain peculiarities worthy of special notice when we come to consider the various localities separately.

At Fort William the collecting was all done on the west side of the Kaministiquia River. We crossed the river in a skiff and followed a road

about a mile and a half over a stretch of level country to the foot of Mt. McKay. This flat area is open and prairie-like for a distance of several hundred yards west of the river, beyond which it is a dense spruce swamp, broken only by the clearings of an Indian village, which are scattered along each side of the roadway. At the foot of Mt. McKay we left the road and followed a footpath up the mountain.

Mt. McKay is a bold basaltic cliff rising suddenly out of the level spruce swamp around it to a height of about 1,000 feet, its sides very steep, and in many places quite perpendicular. The summit is about 1,600 feet above sea level.

Following the path up a steep slope wooded with a mixed growth of small spruce, canoe birch, aspen and a few scattered white pine, we reached, when about half way to the summit, a small treeless plateau, some seventy-five square yards in area, and covered with short grass and small herbaceous plants. This proved an interesting spot for Orthoptera, and will be referred to again in discussing the fauna of this region.

Above the plateau the sides of the mountain are for the most part almost vertical, but we followed a level pathway for some distance through the woods, and then completed the ascent by scrambling over the slabs of a talus slope, finding ourselves at the summit in a scrubby wood of Banksian pine, poplar, birch, etc., with small scattered openings, which yielded good results in Orthoptera.

The prairie-like area adjoining the river would have repaid a longer visit than the few minutes we were able to spend there. The most noteworthy capture made here was that of the interesting northern Dectician, *Idionotus brevipes*, Caud., which is not uncommon on the prairies of Manitoba and ranges westward to Calgary, Alta., and northward into Arctic America. *Mecostethus gracilis* was common here, and, in fact, in open places everywhere in this locality. *Chlœaltis abdominalis*, *Stenobothrus curtippennis*, *Melanoplus femur-rubrum*, *extremus* and *bivittatus* were also quite common.

The road through the spruce swamp was drained on each side by ditches, which were full of water, and along which certain dragon-flies were skimming back and forth in considerable numbers. The rank growth of bushes and weeds along these did not yield much of interest in Orthoptera, the chief species found here being *Scudderia pistillata*, *Mel. bivittatus*, *Mel. extremus* and *Stenobothrus curtippennis*. From openings in the

spruce swamp *Podisma glacialis Canadensis*, *Mel. islandicus* and *Tetrix granulatus* were taken.

At the foot of the mountain is an area of exposed rock, on which *Circotettix verruculatus*, *Camnula pellucida*, *Mel. atlanis*, etc., were very abundant. On the shady path up the mountain-side the only Orthopteran met with was *Mel. islandicus*, which was not uncommon, but when we reached the plateau referred to above, we found *Chlœcaltis conspersa*, *C. abdominalis* and *Sten. curtipennis*, long- and short-winged forms of each; *Mel. extremus* and *fasciatus*, long-winged; *Circotettix verruculatus*, *Camnula pellucida*, *Melanoplus atlanis* and *Tetrix acadicus*. On the top of the mountain both forms of *Mel. fasciatus* and of the two species of *Chlœcaltis* were common, especially the long-winged form of the first-named and that of *C. abdominalis*. A few females of *Mel. altitudinum* and many specimens of *Mel. islandicus* were also taken here.

The country about Nipigon is rugged and picturesque, and wooded with heavier timber than grows in the vicinity of Ft. William. We saw many large white spruce, aspen, balsam poplar and canoe birch, and the vegetation is, generally speaking, more luxuriant than in most parts of Northern Ontario along the Canadian Pacific Railway. The Nipigon River above the Railway Bridge flows swiftly between steep clay banks over a hundred feet high, but a little below it there is a waterfall, after which it flows placidly out to Lake Superior, the banks sloping gently to the water's edge, which is bordered by low bushy pastures and damp woods. Here and there open reedy marshes jut out into the river, and, not far below the fall, there is an island consisting of a narrow strip of tamarack swamp surrounded by a broad belt of open, partly submerged, marsh. This marsh yielded the only species of Orthoptera, *Mecostethus lineatus*, not found at Fort William, and was a wonderful locality for dragon-flies.

The Orthoptera here are practically the same as those found at Fort William. The most noticeable feature was the abundance of *Mel. Bruneri*, which, with *Camnula pellucida*, was the common campestral species, especially on dry soil. *Mel. atlanis* was quite local, and *M. femur-rubrum* does not seem to have been observed at all. The same tendency towards the development of macropterous or long-winged individuals in species usually regarded as normally brachypterous or short-winged was observed here, though apparently not in such a marked degree as upon Mt. McKay.

This development of macropterism in so many species usually regarded as normally brachypterous is the most interesting feature in the Orthoptera of the Thunder Bay District. We find the same tendency in less degree in Northern Michigan, as given in the papers cited above, but farther south long-winged examples of some of these same species are unknown, or of such rare occurrence that they are usually considered somewhat abnormal and as representing cases of reversion to an ancestral type. Such species are, e. g., *Chlœaltis conspersa*, *C. abdominalis*, *Melanoplus fasciatus* and *M. extremus*, though in the last named species the macropterous form is relatively common. The question arises: Why is the proportion of macropterous to brachypterous individuals so much greater in these northern regions than it is farther south?

In the first place, where dimorphism in wing-length occurs the fully-winged type is of course the more primitive one, the flightless type the more recently evolved. The species is tending to become wingless, and the short-winged individuals are therefore better adapted to their environment, while the long-winged individuals are gradually becoming eliminated. Where this process has been most completely carried out only the flightless type remains, and in such cases the species may be apterous, as in *Podisma glacialis*, or extremely brachypterous, the wings remaining as mere vestiges, as in *Melanoplus islandicus*.

Now, where the environment is least favourable to the needs of the species, or where favourable conditions are localized, the elimination of the unfit will proceed more rapidly than it will under favourable conditions, so that we might, *a priori*, expect to find that where the trend of evolution is towards brachypterism this condition will become established most rapidly where favourable conditions of environment are localized, e. g., towards the limits of the geographical range of the species.

It will be noted that all the dimorphic species in question are boreal forms, and are more abundant and generally distributed in the north, where the long-winged forms are plentiful, than towards the southern limits of their geographical range, where this form occurs only sporadically or not at all. Hence it may be concluded that the elimination of the less fit macropterous forms at the south, where the environment is least suited to the species, has been more complete than in the north, where the conditions are more favourable.

There is possibly another factor entering into this question. It is well known that differences in wing-length are correlated with differences

in habitat, and that the habitat of a given species may vary somewhat in different parts of its geographical range. Morse has pointed out that, generally speaking, species inhabiting thickets, edges of woods, etc., are flightless, and either brachypterous or apterous, while those frequenting open places, such as fields, deserts, or exposed rocky surfaces are macropterous, and capable of more or less sustained flight. The dimorphic species in question are restricted in the south to thicket habitats, but in the north, where they are more generally distributed, they occur also, to a greater or less extent, on campestral stations. Hence the macropterous type may be here preserved in adaptation to the campestral habitat.

To what extent this campestral habit actually exists and whether it is a real factor in preserving the macropterous type in these species we are not in a position to say. We have not enough knowledge of the ecology of these species in the north to make any positive statements on the subject. A few facts may be given, however, which seem to lend some support to this view.

Chlœaltis conspersa, which Rehn has recorded from the cool bogs of the pine barrens of northern New Jersey (Ent. News, 1902, p. 310), in the Upper Austral Zone, occurs about the edges of woods and in thickets in the Transition Zone; and Hebard found it at Pequaming, Northern Michigan, "about brush heaps and stumps in *open fields and pastures*" (Rehn, Ent. News, 1904, p. 233). I have also taken it in similar places in the Canadian Zone in Ontario. On account of its egg-laying habits, however, this species probably never strays far from the borders of woods.

At Fort William, where it is dimorphic, *Chlœaltis abdominalis* was heard stridulating in the open grassy plain on the west side of the Kaministiquia River, and specimens were taken on the plateau, half-way to the top of Mt. Mackay. The conditions here were truly campestral, but the plateau was nearly surrounded by woods, and was so small that not much importance can be attached to the presence of the locusts here.

Melanoplus fasciatus and *extremus*, both dimorphic at Fort William, are certainly more generally distributed here than they are farther south; e. g., in the Georgian Bay region. Long-winged males of the former were found flying about the bare talus slope on the side of Mt. McKay, a type of habitat which this species does not frequent in the Transition Zone, where macropterous individuals are very rare. The long-winged male of

M. extremus is said to be the prevailing, if not the exclusive form at high altitudes and latitudes, and the same form of the European locust, *Chrysochraon brachyptera*, a relative of our *Chlœaltis*, is likewise said to be common in damp alpine meadows at considerable heights.

Another feature of interest in the fauna of Fort William and Nipigon is the total absence of Gryllidæ. Low, grassy, partly wooded pastures on the Nipigon River, in every way resembling the favourite haunts in the more southern parts of Ontario of *Nemobius fasciatus* and *N. carolinus* (= *N. angusticollis*, Walk.), were searched for these crickets in vain; nor could the chirping of any Gryllid be heard either by day or night. In fact, the only Orthopterous sound which was heard at night in this district was the occasional "zeep, zeep, zeep, zeep" of the Northern Katydid (*Scudderia pistillata*). During the day, however, the chorus of Orthoptera rivals that of more southern latitudes in the volume of sound produced, though considerably different in quality. Instead of the chirp of *Gryllus*, and the low undertones of *Nemobius*, and the familiar "ze-e-e . . . jip, jip, jip" of *Orchelimum vulgare*, we hear on every side the loud, but not especially harsh, "shkclip—shkclip, shkclip, shkclip" of *Mecostethus gracilis*, the lower-toned but more rapid and harsher "z-z-z-t, z-z-z-t, z-z-z-t" of *Chlœaltis abdominalis*, and the similar, but more subdued, notes of its congener, *C. conspersa*, varied by the still softer tones of *Stenobothrus curtipennis*. An occasional "tsip!" the day note of *Scudderia pistillata*, and the feeble little trill of *Xiphidium fasciatum*, which is only audible at close range, complete the orchestra of this northern region, except in the open bare rocky or sandy places, where *Circotettix verruculatus* keeps up its incessant clatter, and in the open grassy plains at Fort William, where a new and unfamiliar note was heard, leading to the discovery of the Dectician *Idionotus brevipes*. This note is a continuous and monotonous trill, resembling that of *Orchelimum vulgare*, with the "jips" omitted.

Turning now to the Temagami District, we find quite different conditions as regards the Orthoptera. The chief interest possessed by this district in this regard lies in the fact that it is still largely covered with primeval forests, and thus represents entomologically the conditions which once obtained over a large part of the country.

Even Nipigon, though well wooded, has apparently been sufficiently cleared to have brought about an immense increase in the number of individuals of almost all the species native there. In the virgin forests

of Temagami the paucity of insect life, and notably of Orthoptera, was somewhat surprising to one who had never been in a large tract of such country before. One does not expect to find many Orthoptera in a dense northern forest, but not only were the deep woods utterly devoid of them, but even the clearings and open bushy hillsides, such as support multitudes of locusts in a more open country, would generally yield only a few *Mel. atlantis*, *femur-rubrum* and *islandicus*, and *Camnula pellucida*.

The only stations on our route where the common campestral species were found in abundance were the fields and pastures about the village on Bear Island, and in a less degree the clearing on Temagami Island, where the Temagami Inn stands. On Bear Island, for instance, *Mel. bivittatus*, *femur-rubrum* and *atlantis*, *Dissosteira Carolina*, *Camnula pellucida*, *Gryllus Pennsylvanicus* and *Nemobius fasciatus* were all found in their usual abundance, but, strange to say, *Stenobothrus curtipennis*, *Mecostethus gracilis* and *Mel. extremus* were not taken here nor anywhere in the district. The absence of the first-named abundant and widespread species is particularly surprising.

Even the open marshes were extremely unproductive of Orthoptera, for they usually support a growth composed largely of horse-tails (*Equisetum fluviatile*), and sedges, especially the coarse species, *Dulichium arundinaceum*, with but very few grasses. A few *Mecostethus lineatus* in favourable spots, *Scudderia pistillata* and an occasional *Mel. bivittatus*, *femur-rubrum* or *Xiphidion fasciatum* seem to be about the only species which inhabit these swamps.

The Sphagnum bogs are likewise almost barren of Orthoptera, and when covered with Ericaceous shrubs, such as Dwarf Cassandra, Andromeda, Sheep-laurel, etc., the only species likely to be met with is *Scudderia pistillata*.

In general it may be said that the Temagami fauna, in addition to its striking poverty in both species and individuals, differs from that of Fort William and Nipigon chiefly in the absence of most of the western types and certain other species which are common there, and in the presence of the three common ground-cricket, *Gryllus Pennsylvanicus*, *Nemobius fasciatus* and *N. Carolinus*.

(To be continued.)